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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/765,545	01/26/2004	John Edward Eric Baglin	ARC9-2000-0066-US2	2321

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EXAMINER	
KILDAY, LISA A	

ART UNIT	PAPER NUMBER
2829	

DATE MAILED: 07/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/765,545	BAGLIN ET AL.	
	Examiner	Art Unit	
	Lisa Kilday	2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☒ Claim(s) *10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGouey (4,308,592) and Van Zant "Microchip Fabrication."

In re claim 1, McGouey teaches in figure 2a-2g a method for fabricating a magnetoresistive sensor (22) comprising:

a) providing a magnetoresistive structure (structure illustrated in fig. 2a-2g) including one or more ferromagnetic layers (34);

b) disposing a mask (12) between the magnetoresistive structure and an ion source (mask "12" is protecting portions of the magnetoresistive layer "34" from ion implantation in fig. 2E-2G. An ion source is not shown by McGouey however McGouey teaches that ion implantation occurs in the unmasked portions, which inherently includes an ion source to provide ions for the implanation-col. 5, lines 14-30), wherein the mask (12) covers selected portions of the magnetorestive structure to define a sensor (22), (see fig. 2F where the mask "12" covers the structure to define a sensor "22"; col. 5, lines 21-28); and

c) exposing one or more unmasked portions the structure to ions to substantially reduce or eliminate a magnetoresistance of the unmasked portions while leaving the magnetoresistive structure substantially intact (col. 5, lines 25-30).

However, McGouey is silent on whether the exposure of one or unmasked portions of the structure to ions is substantially near room temperature. However, Van Zandt teaches that ion implantation takes place near room temperature (pg. 339, lines 20-29). Therefore, it would have been obvious to one skilled in the art at the time of the invention to perform ion implantation substantially near room temperature in order to increase control of the location and number of dopants put in the wafer and eliminate side diffusion.

In re claim 2, McGouey teaches wherein the ions irradiate one or more ferromagnetic layers in the unmasked portions of the magnetoresistive structure (col. 5, lines 21-23; col. 5, lines 31-37; ref. 52, 54, 56, 58, 60 found in fig. 2G). Note that on pg. 7, lines 13-15 applicant's instant specification discloses that ion irradiation and implantation are interchangeable.

In re claim 3, McGouey teaches wherein the ions are implanted into one or more ferromagnetic layers in the unmasked portions of the magnetoresistive structure (col. 5, lines 21-23; col. 5, lines 31-37; ref. 52, 54, 56, 58, 60 found in fig. 2G).

In re claim 4, McGouey teaches wherein ferromagnetism of one or more ferromagnetic layers in the unmasked portions of the magnetoresistive structure is substantially reduced or eliminated (col. 4, lines 40-43; col. 5, lines 25-30). However, McGouey is silent on whether the unmasked portions of the structure are substantially near room temperature. However, Van Zandt teaches that ion implantation takes place near room temperature (pg. 339, lines 20-29). Therefore, it would have been obvious to one skilled in the art at the time of the invention to perform ion implantation substantially

near room temperature in order to increase control of the location and number of dopants put in the wafer and eliminate side diffusion.

As applied to claim 1, claims 5, 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGouey and Van Zant "Microchip Fabrication" in further view of Lin (5,949,623).

In re claim 5, McGouey teaches a method for fabricating a magnetoresistive sensor (abstract). However, McGouey does not teach prior to step c), sputtering the unmasked portions, wherein shadowing the mask forms one or more tails, wherein the tails are exposed to ions in step c). However, Lin teaches in figures 3 & 4 sputtering the unmasked portions, wherein shadowing the mask forms one or more tails, wherein the tails are exposed to ions in step c) (col. 2, line 65 – col. 3, line 61). Therefore it would have been obvious to one skilled in the art at the time of invention to modify the method of McGouey to sputter the unmasked portions and to shadow the mask in order to form tails because a tail is often formed in the region between the magnetoresistive structure and an ion source.

In re claim 6, McGouey teaches a method for fabricating a magnetoresistive sensor (abstract). However, McGouey does not teach the type of mask. However, Lin teaches wherein the mask is a contact photolithographic resist mask (col. 2, lines 64-66). Therefore, it would have been obvious at the time of invention to modify the method of McGouey to include the use of a contact photolithographic resist mask in order to mask the magnetoresistive sensor in the active region.

In re claim 9, McGouey teaches a method for fabricating a magnetoresistive sensor (abstract). However, McGouey does not teach wherein the ions are projected through a mask and focused onto the magnetoresistive structure, also known as ion beam sputtering. Lin teaches ion beam sputtering where the ions are projected through a mask and focused on the magnetoresistive structure (col. 3, lines 50-56). Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify the method of McGouey in order to control sputtering and the shadowing effects of the mask.

As applied to claim 1, claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over McGouey and Van Zant "Microchip Fabrication" in further view of Campbell et al. (5,264,981).

In re claim 7, McGouey teaches a method for fabricating a magnetoresistive sensor (abstract). However, McGouey does not teach the type of mask. However, Campbell et al. teaches the use of a contact electron beam resist mask (col. 3, lines 1-19; col. 8, lines 60-65). Therefore, it would have been obvious to one skilled in the art at the time of invention to modify the method of McGouey to include the use of a contact electron beam resist mask in order to deposit the ferroelectric films found in a magnetoresistive sensor device that lead to good magnetic properties, high wear resistance, and high hardness.

As applied to claim 1, claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentabl over McGouey and Van Zant "Microchip Fabrication" in further view of Mauri et al. (5,614,727).

In re claim 8, McGouey teaches a method for fabricating a magnetoresistive sensor (abstract). However, McGouey does not teach the type of mask. However, Mauri et al. teaches the use of a stencil mask (step 62; col. 5, line 55 – col. 6, line 20; col. 6, lines 49-55). Therefore, it would have been obvious to one skilled in the art at the time of the invention to use a stencil mask in order to define the shape of the bottom contact and easily remove the stencil mask along with unwanted material after sputtering.

As applied to claim 1, claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over McGouey and Van Zant "Microchip Fabrication" in further view of Stengl et al. (4,985,634).

In re claim 9, McGouey teaches a method for fabricating a magnetoresistive sensor. However, McGouey does not teach wherein the ions are projected through a mask and focused onto the magnetoresistive structure. However, Stengl et al. in figure 3 teaches ion beam lithography which projects ion through a mask and focuses them onto a semiconductor wafer (abstract; col. 1, lines 2042; col. 18, lines 46-66). Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify the method of McGouey by projecting ions onto the wafer through a mask in order to reduce distortion and blurring.

Allowable Subject Matter

Claim 10 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: McGouey teaches in figure 2a-2g a method for

fabricating a magnetoresistive sensor (22) comprising: a) providing a magnetoresistive structure (structure illustrated in fig. 2a-2g) including one or more ferromagnetic layers (34); b) disposing a mask (12) between the magnetoresistive structure and an ion source (mask "12" is protecting portions of the magnetoresistive layer "34" from ion implantation in fig. 2E-2G. An ion source is not shown by McGouey however McGouey teaches that ion implantation occurs in the unmasked portions, which inherently includes an ion source to provide ions for the implanation-col. 5, lines 14-30), wherein the mask (12) covers selected portions of the magnetoresistive structure to define a sensor (22), (see fig. 2F where the mask "12" covers the structure to define a sensor "22"; col. 5, lines 21-28); and c) exposing one or more unmasked portions the structure to ions to substantially reduce or eliminate a magnetoresistance of the unmasked portions while leaving the magnetoresistive structure substantially intact (col. 5, lines 25-30). McGouey is silent on the width of the sensor. Aboaf et al. (5,142,768) teaches away from the claim limitation of forming a magnetoresistive sensor with a width of between about 5-200 nm. Aboaf et al. teaches in col. 5, lines 23-38 that the width of the magnetoresistive sensor is about 12 μm which is 120,000 Å. Prior art does not teach or suggest a method for fabricating a magnetoresistive sensor with the preferred method where the width of the magnetoresistive sensor is between about 5-200 nm.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Heide et al. (4,840,178) teaches that the ion implantation of magnetoresistive structure is a low temperature process because the low temperature

ion implantation allows the magnet to retain its magnetism and leave the

magnetoresistive structure substantially intact (col. 7, lines 30-36).

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 308-0957. See MPEP 203.08.

Any inquiry concerning this communication from the examiner should be directed to Lisa Kilday whose telephone number is (571) 272-1962. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo, can be reached on (571) 272-1957. The fax number for the group is (703) 872-9306. MPEP 502.01 contains instructions regarding procedures used in submitting responses by facsimile transmission.

Lisa Kilday

LAK LAK

7/11/04

LISA KILDAY
PATENT EXAMINER
AU 2829